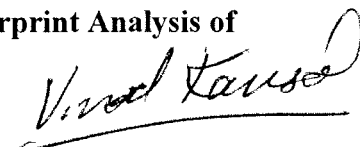


Case Narrative

Preliminary Results of PAH Analysis & Supplemental GC/MS Oil Fingerprint Analysis of Four Product/Oil Samples



Date: December 28, 2010
Project: St. Croix Cistern Sampling: WA# 0-116
Chain of Custody: Numbers not on original chain(s) from Hovensa Environmental Laboratory
Samples/matrix: Four Product or Product/Aqueous Matrix.

This report contains the results of 4 samples received from the St. Croix Cistern Sampling project. Three samples were received on 12/20/10 and one on 12/21/10 for GC/MS Oil Fingerprint Analysis, PAH analysis and TPH analysis. The samples were received in 40 mL VOA vials and appeared to be pure product, or product floating on aqueous layer. The samples were extracted by 12/21/10 using the waste dilution method. Approximately 0.2grams of product was weighed and diluted to 10mL with methylene chloride/hexane (65/35).

The extracts were analyzed for PAH's using the procedures outlined in SERAS BNA SOP(s) #1804 & 1805, which follows method 8270D. The GC/MS system is calibrated and fully certified using NELAC protocols. The extracts were analyzed following full compliance with both Nelac and 8270D quality assurance criteria and procedures.

The product was diluted to approximately 50,000ppm before internal standards were added and samples injected. Sample with SERAS # 012003-007 was extracted and analyzed in duplicate. The results are listed in table 1.0. A second set of extracts from the same waste dilution were diluted further, and analyzed for PAH's using the SERAS GC/MS SIM Oil Characterization Method where the PAH's were calculated. Those results are also presented. The duplicate sample was not analyzed. This was done to compare the PAH results obtained from the traditional "linear scan" BNA analysis to the SIM Oil characterization method which will also be used to quantitate the water extracts, TPH and give oil fingerprint assessment. The product samples are the only samples that are being analyzed using the BNA/PAH linear scan method. The results obtained using the GC/MS SIM method are similar and correlate with the linear scan results. This was done to assure the client of the validity of the SIM PAH calibration vs. the fully Nelac'd BNA/PAH method.

The TPH concentrations are not reported in this document since the samples were "pure product".

Results of Oil Fingerprint Evaluation:

Chromatograms are also attached to this memo with a simple hydrocarbon fingerprint. There are many variants of the chain of custody for these samples, with conflicting information on the original(s) when compared to the actual sample tags on the samples. Below is a list of information for the four samples from the sample tags, and the samples will be referred to by the SERAS #. A brief fingerprint assessment is given with some comments on the physical appearance of the samples.

SERAS #	Sample	No.
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012003-01	HCN Product	#1
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A light amber/clear liquid with a very foul sulfurous odor! The fingerprint (from 3 to 30 min.) shows petroleum products that are GRO and it is composed mostly of alkyl benzenes. It does not contain a significant amount of BTEX, very little toluene and xylenes.

012003-04	LCGO Product	#2
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A deep red/clear liquid with a mild kerosene/diesel odor. The fingerprint displays a classic DRO, or diesel fuel fingerprint, but does not contain a significant abundance of PAH compounds.

012003-07	HCGO Product	#1
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A thick opaque/orange amber liquid with a distribution of n-alkanes spanning c8 through C40. This resembles a classic bunker "C" type of fuel – and again, does not contain a high concentration of PAH's

012003-10	Coker Off Gas	#1
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A bi-phasic sample where only the top layer was analyzed. The top layer matched sample 012003-01.

J.. Syslo

HOVENSA ENVIRONMENTAL LABORATORY

CHAIN OF CUSTODY RECORD

Number of Samples: <u>1</u>		Date Collected: <u>12/17/10</u>		Collected by: <u>Nigel Benjamin</u>		Department: Environmental	
Matrix Code:		Sample Type Code:		Container Type Code:		Preservative Type Code:	
(1) Water (4) Sludge		(1) Grab		(G) Glass (W) Whirlpak		(HCl) Hydrochloric acid (Na ₂ S ₂ O ₃) Sodium Thiosulfate (None)	
(2) Soil (5) Catalyst		(2) Composite		(P) Plastic Other (specify)		(HNO ₃) Nitric acid (NaOH) Sodium Hydroxide	
(3) Oil Other (specify)				(V) VOA		(H ₂ SO ₄) Sulfuric acid (ICE) Cooling	

Analysis Requirement: **ccpt**= chlorine, conductivity, pH, turbidity **coli**=coliform

Sample				Matrix Code	Sample Type Code	Container Type Code	Preservative Code	Container Size	Analysis Requirements
Seq. No.	Time	LOG #	Source						
1	10:40	N/A	D-8501	off vapor	1	✓	N/A	40 mL	
2	10:40	1	1	"	"	"	"	"	
3									
4									
5									
6									
7									
8									
9			* Split Sample - Sample # 2						
10			received by Hovensa. *						
11			* Sample # 1 to EPA *						
12									
13									
14									
15									
16									
17									
18									

Chain of Possession

Sample Relinquished by	Sample Received by	Date	Time	Comments
<u>[Signature]</u>	<u>Philip [Signature]</u>	<u>12/17/10</u>	<u>1629</u>	Subsampled at 4:20pm from 5 stainless steel cylinders sampled above
Relinquished to Lab by	Received for Lab by	Date	Time	Comments
<u>[Signature]</u>	<u>Philip [Signature]</u>	<u>12/17/10</u>	<u>1628</u>	Sample Sequence #1 returned by EPA. Sample Sequence #2 returned by

Received @ LMSERAS on 12/21/10 @ 14:10 Hovensa.
by Larry Martin. The internal temp. of the cooler was 2°C. [Signature] 12/21/10

HOVENSA L.L.C.

ONE ESTATE HOPE, CHRISTIANSTED, VI 00820-5652

SAMPLE Coker Off Gas NO. 1

SOURCE D-8501

TAKEN BY N. Benjamin

REMARKS Subsampled at 4:30 pm from 5 Stainless

steel cylinders 2 hrs

DATE 12/17/10 TIME 1040 (A.M.)

SEE REVERSE SIDE OF TAG FOR HAZARD WARNINGS

012003-10

HOVENSA ENVIRONMENTAL LABORATORY

CHAIN OF CUSTODY RECORD

WO# R012003 *12/20/10*

COC# 116-12/14/10-0001 *12/21/10*

Number of Samples: 9		Date Collected: 12/14/10		Collected by: S Mathers		Department: Environmental	
Matrix Code:		Sample Type		Container Type Code:		Preservative Type Code:	
(1) Water (4) Sludge		Code:		(G) Glass (W) Whirlpak		(HCl) Hydrochloric acid (Na ₂ S ₂ O ₃) Sodium Thiosulfate (None)	
(2) Soil (5) Catalyst		(1) Grab		(P) Plastic Other (specify)		(HNO ₃) Nitric acid (NaOH) Sodium Hydroxide	
(3) Oil Other (specify)		(2) Composite		(V) VOA		(H ₂ SO ₄) Sulfuric acid (ICE) Cooling	

Analysis Requirement: **ccpt**= chlorine, conductivity, pH, turbidity **coli**=coliform

Sample				Matrix Code	Sample Type Code	Container Type Code	Preservative Code	Container Size	Analysis Requirements
Seq. No.	Time	LOG #	Source						
01 1	4:50	N/A	HCN Product (DCU) #1	3	1	V	N/A	40 mL	
02 2			HCN Product (DCU) #2						
03 3			HCN Product (DCU) #3						
04 4			*LCVG Product (DCU) #1						
05 5			*LCVG Product (DCU) #2						
06 6			*LCVG Product (DCU) #3						
07 7			**HCVG Product (DCU) #1						
08 8			**HCVG Product (DCU) #2						
09 9			**HCVG Product (DCU) #3						
10									
11									
12									
13									
14									
15									
16									
17									
18									

Chain of Possession ** Sample Label Reads "LCGO Product" 12/20/10*
*** Sample Label Reads "HCGO Product"*

Sample Relinquished by	Sample Received by	Date	Time	Comments
<i>[Signature]</i>	<i>[Signature]</i>	12/15/10	16:07	
Relinquished to Lab by	Received for Lab by	Date	Time	Comments
<i>[Signature]</i>	<i>[Signature]</i>	12/15/10	16:30	
	<i>[Signature]</i>	12/20/10	10:35 ²⁰⁰	Received By <i>[Signature]</i> Date/Time 12/20/10 11:47

HOVENSA L.L.C.

ONE ESTATE HOPE, CHRISTIANSTED, VI 00820-5652

SAMPLE HCN Product NO. #1

SOURCE Delayed Coker Unit

TAKEN BY Veron Christian

REMARKS DCU Incident

Sample split at Hovensa QC Lab

DATE 12/14/10 TIME 4:50 A.M.
P.M.

SEE REVERSE SIDE OF TAG FOR HAZARD WARNINGS

012003-01

HOVENSA L.L.C.

ONE ESTATE HOPE, CHRISTIANSTED, VI 00820-5652

SAMPLE LC 60 Product NO. #2

SOURCE Delayed Coker Unit

TAKEN BY S. Mathers

REMARKS DCU Incident

Sample Split at Hovensa QC Lab

DATE 12/14/10 TIME 4:50 A.M.
P.M.

SEE REVERSE SIDE OF TAG FOR HAZARD WARNINGS

012003-04

HOVENSA L.L.C.

ONE ESTATE HOPE, CHRISTIANSTED, VI 00820-5652

SAMPLE HC GO Product NO. #1

SOURCE Delayed Coker Unit

TAKEN BY S Mathers

REMARKS DCU Incident

Sample split @ QCLab-HOVENSA

DATE 12/14/10 TIME 4:50 A.M.
P.M.

SEE REVERSE SIDE OF TAG FOR HAZARD WARNINGS

012003-07